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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,171	11/19/2001	Steven G. Goebel	8540G-000080	6895

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EXAMINER
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DUONG, THANH P

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/992,171

**Applicant(s)**

GOEBEL ET AL.

**Examiner**

Tom P Duong

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 19-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 13-17 is/are rejected.
- 7) ☒ Claim(s) 10-12 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/19/2001.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

Claims 1-7 are objected to because of the following informalities:

In claims 2-7, the preamble "The fuel processor" should be replaced with "The reforming fuel cell system."

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-2, 8, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettit et al. (6,485,853) in view of Okamoto et al. (6,582,841). The reforming system is being treated as an apparatus. Regarding claims 1 and 13, Pettit discloses a reforming fuel cell system (Fig. 1) comprising: a reformer (16) converting a hydrogen-containing fuel to produce an H<sub>2</sub>-containing reformat having a level of carbon monoxide (Col. 2, lines 62-66), a first reactor (48) operable to reduce said level of carbon monoxide of said reformat (Col. 4, lines 57-62); a fuel cell stack (2) generating electrical energy (Col. 1, lines 12-15) from said reformat and discharging an effluent H<sub>2</sub>-containing anode (8) effluent and an O<sub>2</sub>-containing cathode (10) effluent; a combustor (12) having a catalyst bed disposed therein for burning said anode (8)

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effluent to generate an exhaust gas (14); a heat exchanger (60,80) thermally coupled to said first reactor (48) to control the temperature said heat exchanger having an input fluidly coupled to said combustor (12) to receive said exhaust gas (14); a shift reactor (48, 56) to reduce the carbon monoxide level; and a preferential oxidation reactor (58) to further reduce the carbon monoxide level. Pettit fails to disclose a controller operable for metering airflow to said combustor to control the combustion temperature. Okamoto teaches a reformat gas pressure controller 60 which regulates airflow (via valve 26) to the combustor (14) in order to control the combustor's outlet temperature. Thus, it would have been obvious in view of Okamoto to one having ordinary skill in the art to modify the system of Pettit with a controller as taught by Okamoto in order to control the output temperature of the combustor. Regarding claims 2, 8, and 14, Okamoto shows a cathode control valve system (26) disposed between said fuel cell stack (20) and said combustor (14), said cathode control valve system operable to direct said cathode effluent (via line 24a) to said combustor (14) to control the temperature of said combustor as a function of the H<sub>2</sub> content of said anode effluent (Col. 5, lines 15-22). Thus, it would have been obvious in view of Okamoto to one having ordinary skill in the art to modify the reforming system of Pettit with a cathode control valve system as taught by Okamoto in order to direct the proper amount of effluent to the combustor to provide proper temperature in the combustor. With respect to the combustion burner, it is conventional to provide a burner coupled to a combustor in order to facilitate combustion of the fuel in the combustor and it would have been obvious to do so here.

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2. Claims 3, 9, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over applied references (Pettit et al. '853 in view of Okamoto et al. '841) as applied to claims 2 and 8 above, and further in view of Keskula (6,159,626). Regarding claims 3, 9, and 15, Okamoto shows a first control valve fluidly coupled between said fuel cell stack and said combustor, said first control valve selectively actuated between an opened position to enable flow of said cathode effluent to said combustor and a closed position to prevent flow of said cathode effluent to said combustor as described in claim 2, above but the applied references fail to disclose a second control valve fluidly coupled between said fuel cell stack and an exhaust passage, said second control valve selectively actuated between an opened position to enable exhausting of said cathode effluent and a closed position to provide a back pressure to facilitate flow of said cathode effluent through said first control valve. Keskula teaches a back pressure valve 47 (Col. 6, lines 14-16) is used to control the amount of bleed off cathode exhaust supplied to the combustor 34 and such valve applies a back pressure to allow the majority of the cathode exhaust to the combustor. Thus, it would have been obvious in view of Keskula to one having ordinary skill to modify the reforming system of the applied references with a back pressure valve of Keskula to allow greater portion of the cathode exhaust to the combustor and/or to facilitate deliverance of the cathode to the combustor.

3. Claims 4-6 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettit et al. '853 in view of Borup et al. (6,521,204). Regarding claims 4 and 16,

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Pettit discloses a second reactor (58) disposed between said first reactor (48) and said fuel cell stack (2), said second reactor being operable to further reduce carbon monoxide level (Col. 5, lines 31-34) of said reformat exiting said first reactor (48); a combustion heater (12) outputting a heated exhaust stream (14). Pettit '853 fails to disclose a start vaporizer disposed downstream from said combustion heater, said start vaporizer being exposed to said heated exhaust stream for vaporizing an inlet fluid to produce a steam, said steam from said start vaporizer. Borup shows a water spray member (18) disposed downstream from said combustion heater system (16), said water spray member being exposed to heated exhaust stream for vaporizing the water (26) into steam (via line 49) and the steam is directed to the heat exchanger of associated with the second reactor (50). Thus, it would have been obvious in view of Borup to one having ordinary skill in the art to modify the reforming system of Pettit with a water spray member as taught by Borup in order to generate steam to be used in the second reactor. Regarding claim 5, Borup shows a spray vaporizer (18) selectively injecting a cooling fluid (26) into said heated exhaust stream (Fig. 1, EXIT) to reduce the fluid temperature. Regarding claims 6 and 17, Borup shows a run vaporizer (18) exposed to an exhaust flow from a heat exchanger element of said first reactor for vaporizing an inlet fluid to produce a steam (via line 42), said steam from said run vaporizer being directed to an inlet of said reformer (POX SR). With respect to the spray vaporizer and run vaporizer, it would have been obvious in view of Borup to one having ordinary skill in the art to provide a spray vaporizer for normal operation and then duplicate additional vaporizers such as a start vaporizer to generate steam to facilitate

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start up for a reformer, reactors and/or other devices in the reforming system. In addition, it would have been obvious in view of Borup to provide a plurality of vaporizers since the court held that mere duplication of parts has no patentable weight. See *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pettit et al. '853 in view of Borup et al. '204 and further in view of Brooks et al (6,716,400). Pettit discloses a second reactor (58) disposed between said first reactor (48) and said fuel cell stack (2), said second reactor being operable to further reduce carbon monoxide level (Col. 5, lines 31-34) of said reformat exiting said first reactor (48); a combustion heater (12) outputting a heated exhaust stream (14). Pettit '853 fails to disclose a start vaporizer disposed downstream from said combustion heater, said start vaporizer being exposed to said heated exhaust stream for vaporizing an inlet fluid to produce a steam, said steam from said start vaporizer. Borup shows a water spray member (18) disposed downstream from said combustion heater system (16), said water spray member being exposed to heated exhaust stream for vaporizing the water (26) into steam (via line 49) and the steam is directed to the heat exchanger of associated with the second reactor (50). Thus, it would have been obvious in view of Borup to one having ordinary skill in the art to modify the reforming system of Pettit with a water spray member as taught by Borup in order to generate steam to be used in the second reactor. Borup shows a spray vaporizer (18) selectively injecting a cooling fluid (26) into

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said heated exhaust stream (Fig. 1, EXIT) to reduce the fluid temperature. Pettit in view of Borup fails to disclose a flow through said combustion heater, said spray vaporizer, said vaporizer, said first reactor, and said combustor is reversible so as to alternatively position said combustion heater, said spray vaporizer, and said start vaporizer upstream and downstream from said first reactor. Brooks '400 teaches an alternative combustor configuration where the combustors (14c, 10c) is located upstream of the vaporizers and combustors (21,21c, 22, 22c) and the combustors (14c,10c) utilizes the recycle fuel cell off gas to provide combustion and heat energy for use in combustor and heat exchange devices. Thus, it would have been obvious in view of Brooks '400 to one having ordinary skill in the art to incorporate the combustor upstream of the vaporizer as taught by Brooks in Pettit in view of Borup to provide combustion means for generating heat for combustor and heat exchange devices.

***Allowable Subject Matter***

Claims 10-12 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom P Duong whose telephone number is (571) 272-2794. The examiner can normally be reached on 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Duong  
May 17, 2004

TD

  
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